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## SPRING WATER SUPPLY IN COOKEVILLE

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THE city of Cookeville is located in the central part of the State of Tennessee, in the western foothills of what is commonly called the "Cumberland Plateau."

It is primarily an agricultural district, with considerable pulp and veneer woods and hickory handle factories as attendant industries.

The Tennessee Polytechnic Institute is located at the north edge of the city; this school has a normal enrollment of 800. The population of the town varies with the student population and averages 3,500 people.

### ***First Municipal Water Supply***

Dug wells at the site of the electric light plant within the city comprised the first attempt in Cookeville to develop a municipal water supply. Mains were laid at that time to serve a small portion of the business district, and pumping was done by direct pressure, the surplus water going into a small concrete basin at the side of the power house. These wells soon failed to furnish sufficient water, even in times of minimum usage.

The next attempt was Whitson Spring, located at a point some two and one-half miles from the city. A 2-inch wrought-iron pipe line was laid to the

spring, and a small motor-driven reciprocating pump was used constantly, pumping to the concrete basin at the site of the power house. Another similar pump was installed in the power house, pumping into the mains with direct pressure.

The limiting feature of this system was the carrying capacity of the small pipe line. Further troubles were experienced in keeping the pump in working order, as it was in an isolated location.

At the best, only about 40,000 gallons a day could be secured, and use was limited at all times of the year.

Due to the geological formations in this district and the existence of numerous caves and faults in the earth's surface, the water supply was highly polluted, and, after each rain, it became very muddy.

### ***Municipal Hydro Plant is Built***

In the meantime, the city had gone to considerable expense in the construction of a municipal hydro-electric plant at Burgess Falls, on the Falling Water River, about eighteen miles from the city.

Electric current was made available in large quantities and at attractive rates, especially to industries.

There was an immediate demand



The supply basin and pump house at Cookeville.

that the city should secure a water supply in keeping with its electric light plant. Bonds were voted without a definite plan for a water supply in view; the only objective was plenty of water.

At this period the author's firm was employed to report upon the feasibility of the various projects offered, and to prepare plans upon the project selected by the city.

A study of geological conditions soon showed the inadvisability of any attempt to secure a supply by impounding methods or by further attempts at a well supply.

Also, the ample supply of electric current for pumping purposes made it possible to go a considerable distance to develop a supply and to pump against comparatively high heads.

A large spring, known as "Anderson's Spring," was finally selected as the most feasible source. This spring is located about five miles southeast of the city and is adjacent to the Falling Water River. Its site is in a deep canyon and it flows in several points.

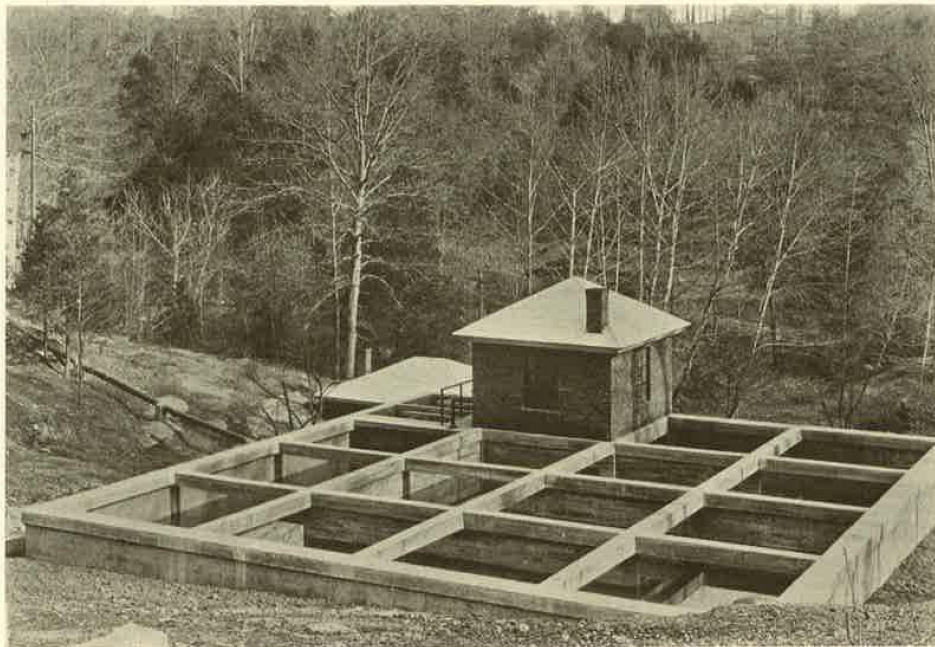
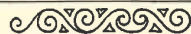
Its flow has been weired at from 200 to 1,000 gallons per minute and it averages close to 500 gallons per minute.

The volume has been great enough to operate a grist mill for many years and to operate a hydraulic ram for supplying water to the Anderson Farm.

#### ***Anderson Spring Water Good***

The water is very clear except in periods following a rain. Bacteriological analysis showed slight contamina-





The settling basin of the Cookeville water supply system.

tion. At normal times no further treatment than chlorination is necessary, but coagulation is deemed advisable. The proximity of the Falling Water River, about 1,300 feet distant, as a standby supply, made the Anderson Spring particularly desirable for a quantity supply.

#### ***Gravity Flow Provided***

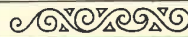
The plan that was finally selected and carried out by the city involved tapping Anderson Spring at three points, thus insuring no surface contamination. A gravity flow was provided, through cast-iron pipe, to the coagulation basin.

This basin is of reinforced concrete construction, designed for a six-hour retention period at a rate of consumption of 700,000 gallons per day.

It is constructed with an agitator and chemical house adjacent, and with a complete cast-iron drainage system for cleaning the basins.

During periods of low consumption, the surplus flow from the spring is allowed to waste through a tee located just below the basins, thus insuring the free flow from the spring at all times.

The chemical house contains the Keystone Chemical Machine and a Wallace and Tiernan Chlorinator for feeding liquid chlorine to the water as it leaves the basin, going to the high service



pump units.

The pump house is built about 60 feet distant and 18 feet below the coagulation basin. Space has been provided by this location for the possible future installation of a rapid sand filter plant, should the springs fail and the use of the river water become necessary.

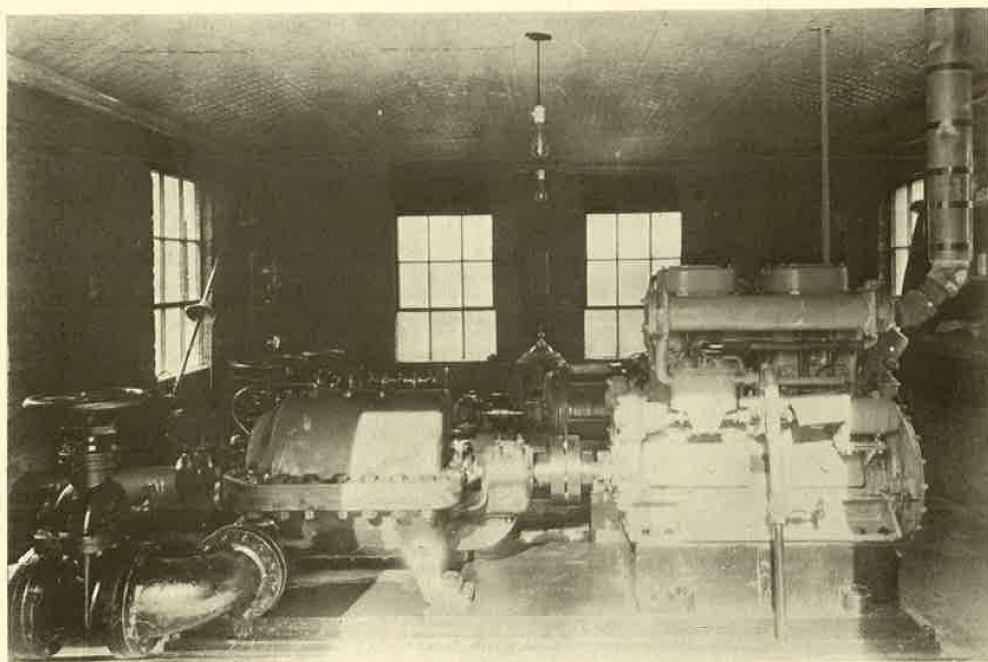
The pump house is of brick construction, fireproof. One pumping unit is a motor-driven 300-gallon-per-minute centrifugal pump, operating against a 320-foot head.

The other unit is a marine engine-driven 500-gallon-per-minute centrifugal pump, operating against a 360-foot head.

Each unit has separate suction lines;

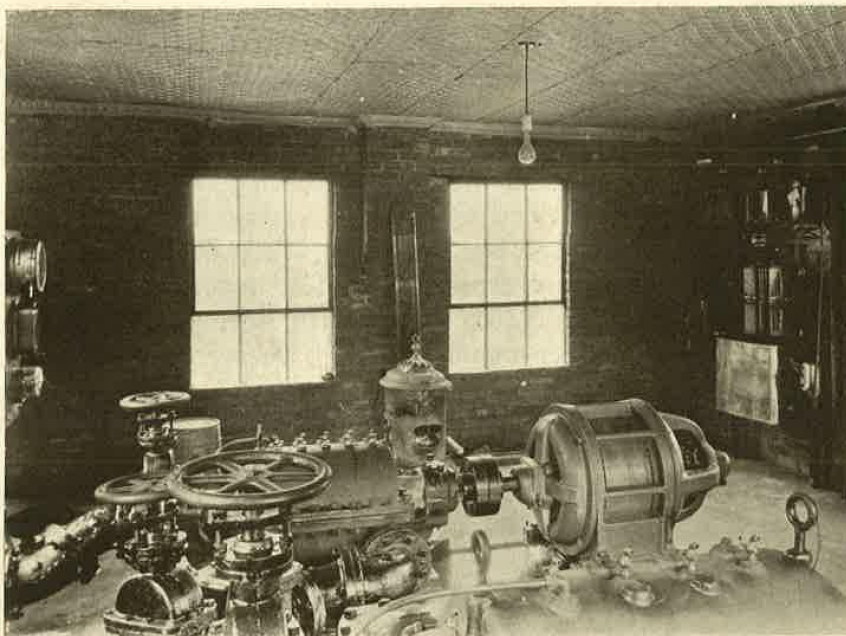
the discharge lines unite at a point just inside the pump house, in front of a General Electric flow meter. This meter is connected to a switchboard upon which are indicating, registering and recording instruments.

The emergency connection to the Falling Water River is made at a point 1,300 feet down the canyon from the Anderson Spring. Here a small brick pump house was constructed, containing two pumping units. One is motor driven, the other marine engine driven—both centrifugal units. Each is of 500-gallon-per-minute capacity; 2,300-volt current is secured over a line from the transformer station. The discharge to the coagulation basin is secured



Marine engine pumping unit—Cookeville water supply system.





Motor-driven pumping unit—Cookeville water supply system.

through an 8-inch cast-iron main.

The discharge main to the city is 10-inch cast-iron pipe, and is 23,000 feet long. Storage of water within the city is provided by a 250,000-gallon elevated tank located at the northwest part of the town, on the side opposite the supply.

The important feature of this new water supply is the duplicate power units at each pump station, insuring the city a supply of water should any trouble develop with the hydro plant or the transmission lines. The large storage of water within the city eliminates the necessity of keeping additional operators at the pump station for night work.

A desirable feature of the entire system is the small per cent of small pipe. Upon a fire-flow test by the Underwriters, it was found possible to furnish 750 gallons per minute in the mercantile district, at forty-five pounds residual pressure.

The contract for the construction work was let in June, 1924, to the Pittsburgh-Des Moines Steel Company and it was completed by them in the remarkably short time of four months.

F. E. Collier is the Water Superintendent for the city. V. V. Long and Company, of Oklahoma City, Oklahoma, were the designing and supervising engineers for the work. The entire cost of the plant was \$145,000.